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CA 2293974 A1 2001/07/17

(21) 2 293 974

(12) DEMANDE DE BREVET CANADIEN  
CANADIAN PATENT APPLICATION

(13) A1

(22) Date de dépôt/Filing Date: 2000/01/17

(41) Mise à la disp. pub./Open to Public Insp.: 2001/07/17

(51) Cl.Int<sup>7</sup>/Int.Cl.<sup>7</sup> H04B 7/00, G09F 25/00

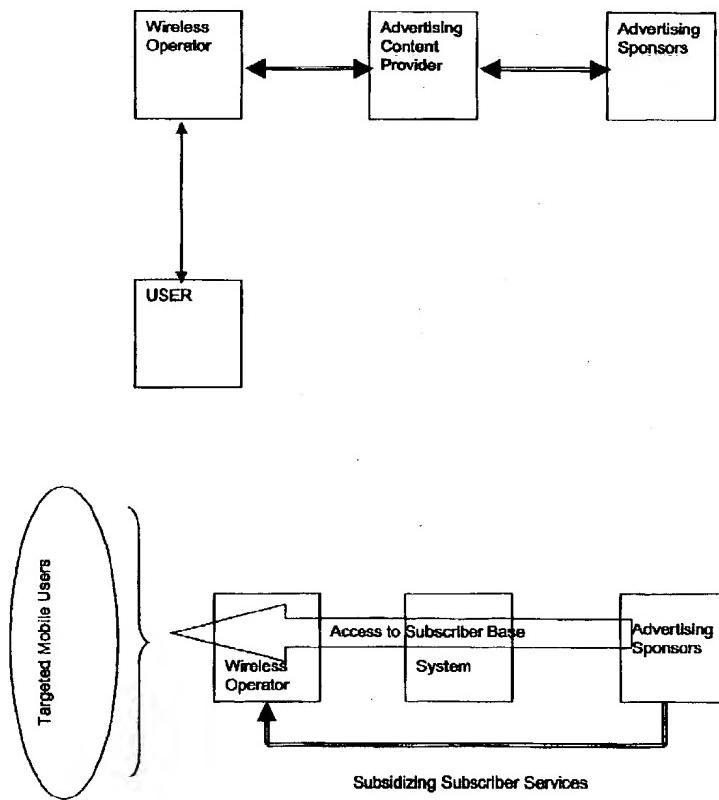
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(54) Titre : METHODE ET SYSTEME DE LIVRAISON DE MESSAGES PUBLICITAIRES ET DE DETERMINATION DE LA CIBLE, SUR RESEAUX SANS FIL

(54) Title: METHOD AND SYSTEM FOR DELIVERY AND TARGETING ADVERTISEMENTS OVER WIRELESS NETWORKS



(57) Abrégé/Abstract:

The present invention is a system and method for targeting and sending advertising and content messages to wireless users via standardized message channels of the wireless network assuring strict individual privacy of wireless users. The network contains a plurality of clusters comprising two physical nodes communicating with each other via a public network. The first, the

**(57) Abrégé(suite)/Abstract(continued):**

mediation server, receives raw positioning data from the wireless network and sends generic mobility data with encrypted personal identities to the profiling server. This latter tracks and profiles real-time and non-real time mobility data compiling data bases of wireless user profiles to permit targeting of individual advertisements. The profiling server targets multimedia-advertising messages to users with matching profiles and forwards those messages to the mediation server for encryption and further message compilation and transport. Wireless user privacy is achieved by separation of data collection and message transmission functions from the profiling and targeting functions.

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ABSTRACT

The present invention is a system and method for targeting and sending advertising and content messages to wireless users via standardized message channels of the wireless network assuring strict individual privacy of wireless users. The network contains a plurality of clusters comprising two physical nodes communicating with each other via a public network. The first, the mediation server, receives raw positioning data from the wireless network and sends generic mobility data with encrypted personal identities to the profiling server. This latter tracks and profiles real-time and non-real time mobility data compiling data bases of wireless user profiles to permit targeting of individual advertisements. The profiling server targets multimedia-advertising messages to users with matching profiles and forwards those messages to the mediation server for encryption and further message compilation and transport. Wireless user privacy is achieved by separation of data collection and message transmission functions from the profiling and targeting functions.

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**BACKGROUND OF THE INVENTION**

**2.1**

**AREA OF THE ART**

This invention relates to systems and methods of delivery of advertisements to the wireless telephony users , targeting of advertisements delivered over wireless networks and in particular relates to a system that assures integrity and confidentiality of the stored wireless subscriber's personal information.

This invention relates to systems and methods of delivery of advertisements to the wireless telephony users and targeting of advertisements delivered over wireless networks based on non-personally identifiable information of wireless subscriber's behavior.

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Herein, promotional messages include advertisements, public service announcements, surveys, and the like, delivered in text, video and/or graphic formats.

## 2.2 DESCRIPTION OF THE PRIO ART

Wireless users pay network access and/or usage based fees and/or administration charges to wireless carriers in exchange for the ability to communicate with other users. In recent years, systems have been proposed which enable telephony users to receive free and/or subsidized calls in exchange for listening promotional messages provided by third party sponsors. So far these systems have been deployed within the framework of traditional telephony services operating based on recorded voice messages. Moreover, such systems have been designed to carry out the message selection (targeting) process based on personal information voluntarily provided by users via questionnaires upon sign up of the contract between the system and the subscriber. The information received over questionnaires enables profiling of static parameters, providing no insights into evolution of user's profile and user's current conditions.

In advertising, it is considered highly desirable to target advertisements to the appropriate potential customer base, rather than to broadcast advertisements in general. One of the very informative sources of information to be used for targeting is historical track of user's whereabouts and instantaneous geographical positioning of the user. Proximity of users to something may lead to conclusion about what kind of information the users would be interested to receive. Historical mobility information allows to segment wireless users according to the visiting locations and behavior of the user's mobility patterns. Presently mobility information is available through Call Detail Records output for user billing purposes. Introduction of GPS based on location tracking, MPS, and the like will foster more precise location dependant targeting.

User mobility information presents personally sensitive material about users therefore it is important for the system tracking user's locality to assure privacy of user personal information.

Presently wireless operators offer SMS service enabling exchange of alphanumeric messages between wireless users and message centers. In the near future wireless operators expect offer WAP services giving advantage of full Internet access over wireless terminals. All that creates a strong opportunity for offering subsidized wireless service in exchange for presentation of advertising messages.

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SUMMARY OF THE INVENTION

It is an object of the present invention to provide a system which delivers user's mobility pattern targeted advertisements and promotional messages to groups/or individuals via packet/or switched wireless networks and telephony devices including SMS enabled wireless voice terminals and WAP terminals.

According to one aspect of the invention, a network system for delivering advertising messages to wireless users is provided and includes a plurality of network clusters consisting of a mediation servers and profiling servers, the mediation server functions as a conduit communicating messages between the user and the profiling server, the profiling server acts as a collector of the messages coming from the mediation server.

According to another aspect of the invention, a network system for delivering promotional messages to wireless users is provided and includes a data base containing continually accumulated user's geographical mobility data stored in non-personally identifiable format; a profiling module for obtaining identification numbers of the targeted group of users based on preset targeting criteria of each promotional message; a mediation module for interfacing with telecommunications devices carrying out delivery of the messages to the wireless terminals of users and receiving user's mobility data, and for protecting privacy of user's personal identities.

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The system includes a data base for storing user's mobility data such as user's instantaneous positioning data in unified coordinates and time of registration in the geographical locality. The user's location parameters are identified in the data base by unique profile identification numbers corresponding to unique mobile identification numbers representing true user's identity. The profile identification number does not allow to determine calling number or any other identity of users.

According to another aspect of the present invention, a method for delivering advertising messages to wireless users is provided and includes profiling of user's mobility data according to targeting criteria of each promotional message to obtain each of the personal identification numbers associated with the targeting criteria; delivering to the user an advertising message according to the presentation parameters associated with the message.

According to another aspect of the present invention, a method for delivering promotional messages to wireless users in a wireless system is provided and includes storing data indicative of advertising messages associated with descriptive attributes of the targeting group of users; list of targeting attributes associated with the descriptive attributes of advertising messages for automatic profiling of the data base containing user's historical mobility data.

According to another aspect of the present invention, a method for delivering promotional messages to wireless users is provided and includes securing of personal data of users to ensure that no personally identifiable information is collected by an advertising agency in the historical data base to target promotional messages. Security of user's personal information is achieved through substitution of user specific identifiers (e.g. mobile identification number, international mobile system identity, etc.) such that profiling data bases within an advertising network are prevented from determining the true identity of users. The substitute identifiers are constructed by the mediation module processing profiling server specific substitute identifiers constructed from data specific to users.

The present invention uses mobility information to determine the profile of a wireless user, and in particular the behavioural profile in terms of user's interests, habits and preferences suggested by a user's mobility pattern. To accomplish this, the present invention provides (i) a tracking and profiling data base for recording user mobility with respect to location and time received from the wireless network; (ii) a target profile data base containing profiles of targeting groups; (iii) management processor handling selection of targeting users. Over time, the tracking and profiling data base holds a history and/or pattern which in turn is interpreted as a user's habits and/or preferences. In that respect, a behavioural profile is deduced from the recorded mobility in the tracking and profiling data base.

In accordance with another aspect of the present invention, there is a data base that records history of user's mobility. For each wireless user, the data base records estimates of the user's location and time of registration in the recorded location.

In accordance with another aspect of the present invention, a method a network solution for exchange of profile data is provided and includes format of profile data standardized across said advertising network and rules of exchange of said profile data between communicating entities.

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BRIEF DESCRIPTION OF THE DRAWINGS

FIG.1 is a conceptual diagram of tow-way exchange between advertisement third part sponsors and wireless operators using the system of the present invention;

FIG.2 illustrates top level block diagram of the network cluster of the present embodiment consisting of a Profiling Server and a Mediation Server. The network cluster shown communicates with a wireless network receiving mobility data from the wireless network, and transmitting advertisements to the wireless network;

FIG.3 is a top level architectural diagram of a Profiling Server including essential modules and data bases;

FIG. 4 illustrates formats of data records stored in the data stores of a Profiling Server;

FIG. 5 is a flow-chart illustrating operation of a Targeting Processor of a Profiling Server

FIG. 6 is a top level architectural diagram of a Mediation Server including essential modules and data bases;

FIG. 7 illustrates a high-level block diagram of an exemplary distributed network with which the principles of the present invention may be suitably used to provide a central Mediation Server for coordinating mobility profile data exchange between individual Profiling Servers;

FIG. 8 is a flow-chart illustrating operation of the system of the present embodiment in the mode of execution of a marketing campaign;

FIG. 9 is a flow-chart illustrating operation of the system of the present embodiment in the mode of collecting and storing mobility data;

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### DETAILED DESCRIPTION

The present invention is a network communications system for delivering highly targeted advertisements to individual and/or group wireless users via wireless networks and wireless user terminals including SMS and WAP enabled terminals. The systems offers high precision of selecting targeted group of wireless users through tracking and profiling of user's mobility data collected from wireless networks. The systems collects and stores user mobility data in non-personally identifiable format to protect the privacy of wireless users.

As illustrated in Fig. 1, the system of the present invention facilitates a two-way exchange between wireless operators holding subscribed wireless users and third party sponsors (e.g., advertisers) with the purpose to enable access of the sponsors to the targeted wireless users.

The system of the present invention enables wireless operators to offer subsidized telecommunications services to wireless users in exchange for delivering advertisements provided by the third party sponsors. The system enables third party sponsors to deliver advertising messages to the target groups of wireless users via wireless telephony networks in exchange for message distribution fees (i.e., analogous to fees paid to obtain space and/or time on traditional advertising media like print, radio and television). The wireless operators would receive payment for providing (i) access to the subscriber base and (ii) connectivity with telecommunications devices for the delivery of advertisements and the collection of user mobility data.

To facilitate a complete understanding of the invention, the remainder of the detailed description is arranged within the following sections and subsections:

- I. **Glossary of Terms and Acronyms**
- II. **Overview of the Preferred System**
- III. **Implementation of the Preferred System**
  - A. **Profiling Server**
  - B. **Mediation Server**
  - C. **Network Architecture**
- IV. **Method for Encryption of User Identities**
- V. **Method for Profile Exchange**
- VI. **System Operation**

- I. **Glossary of Terms and Acronyms**

**CDR Call Detail Record**

**CMS Central Mediation Server**

**CTP Collection and Translation Processor**

**DMB Distribution Message Bank**

**DP Distribution Processor**

**EDR Event Detail Record**

**EM Encryption Module**

**EP Privacy Module**

**GPS Global positioning system**

**UHPB User Habit Profile Bank**

**HPB History Profile Bank**

**IMDB Instant Mobility Data Base**

**IMSI International Mobile Subscriber Identification**

**LDMS Location Data Message Storage**

**MDMS Mobility Data Message Store**

**MDR Mobility Data Records**

**MIN Mobile Identification Number**

**MP Management Processor**

**MPB Mobility Profile Bank**

**MPS Mobile Positioning System (Ericsson Trademark)**

**MS Mediation Server**

**MSG Message**

**PDW Profile Data Warehouse**

**PIN Personal Identification Number**

**PITT Personal Identity Translation Table**

PP Profiling Processor

PS Profile Server

PSI Profiling Server Identity

SMS Short Message Service

TP Targeting Processor

TPB Target Profile Bank

WAP Wireless Application Protocol

## II. Overview

This section provides an overview of a communication system in a preferred embodiment of the present invention. Illustrated in FIG. 2 is a high level block diagram of the basic architecture of the communication system. The system includes a mediation server and a profiling server communicating with each other by use of a remote link. The profiling server is operated by the advertisement provider whereas the mediation server is operated by both wireless operator and the advertisement provider. The system allows for collecting user mobility data in non-personally identifiable format, profiling mobility patterns, compiling user profile data bases and delivering advertising messages to the targeted users via standardized communication channels.

The basic operation of the system is as follows in the preferred embodiment. Conceptually the system operates in two modes such as an off-line mode and an on-line mode. The on-line mode of operation is associated with actions taken on the request to deliver an advertisement to the targeted group of users. The off-line mode of operation is associated with continually performed tracking and profiling of geographical positioning of users received from wireless network and comparing attributes of the targeting command with the profile data for each of the wireless users.

The on-line system operation is initiated by an advertising agency requesting the system to distribute advertising message to the group of wireless users with matching characteristics (e.g., frequent visitors of the convention centres situated in some locations or frequently travelling professionals of a certain subject area). An interactive tool enables to translate description of the targeted group in the set of targeted parameters defining the preferred attributes (e.g., location, time, professional designation, personal interests and other information). The system stores advertising message coupled to the array of preferred attributed in a message bank.

In the on-line operation the system associates targeted criteria of the advertising message with dynamically updated profiles of wireless users to identify the most likely group of profile identification numbers representing a group of targeted users. The system associates each of advertising messages with corresponding array of profile identification numbers. As a next step, the system translates profile identification numbers into mobile identification number for delivering advertising message to user's wireless terminal. The system delivers messages to wireless users according to the transmission and presentation preferences specified for each of advertising messages.

In the off-line operation, the system continually collects user positioning data providing real-time tracking of the targeted group and dynamic profiling according to preset targeting criteria.

### III. Implementation

#### A. The Profiling Server

FIG.3 illustrates the top level logical architecture of the Profiling Server including key components according to a preferred embodiment of the invention. As described in detail below, the Profiling Server includes a targeting processor, a profiling processor, a management processor and a profiling data base. Each of the component parts shown in FIG.3 are described below.

Referring to FIG3, the Profile Data Warehouse (PDW) consists of a collection of data stores including a History Profile Bank (HPB), a Habit Profile Bank (HPB), a Target Profile Bank (TPB) and a Mobility Profile Bank (MPB). The PDW stores and maintains all the information on targeting profiles including current geographical positioning, historical behaviour data and habitual categories inferred from historical behaviour data.

The Mobility Profile Bank (MPB) receives and stores most recent positioning data transmitted from the mediation server as a sequence of records indicating geographical positioning. The structure of the positioning data stored in the MPB as shown in FIG. 4A includes, but not limited to, the profile identification number, the geographical coordinates expressed in latitude and longitude, the time stamp and the calling area code. The primary function of the MPB is to provide a short-term buffering of the incoming positioning data records to support filtering and profiling functions carried out by targeting and profiling processors as defined below. Mobility data records initially coming to the MPB are forwarded to the historical profile bank for long-term storage.

FIG. 4B shows the Targeting Profile Bank (TPB) structure for the targeting profiles. Included, but not limited to, in each of the targeting profile are advertising message, category identifier, targeting conditions and presentation conditions. The targeting profiles are constructed through manual association of each ad message with targeting profile criteria for the ad message and other data regarding presentation of the ad message. The profile construction is facilitated by the Management Processor providing interactive software environment for setting up profiling properties for each targeting profile.

The History Profile Bank (HPB) receives, stores and maintains profile positioning information for each of the profile identification numbers as shown in FIG. 4C. The HPB continually receives mobility records from the MPB storing only essential positioning parameters such as location, time and a time-step parameter. The time-step parameter indicates how fast changes in the mobility pattern have been happening. The primary function of the HMDB is to respond on queries from the CP to identify each of the PINs that deemed to have mobility pattern matching the one specified in queries.

In short, the Management Processor (MP) defines, stores and manages campaign order information and specification parameters.

The MP enables a system operator to define the marketing campaign, associating the marketing message with a targeting command, containing (i) attributes of the targeted group of profiles and (ii) parameters of the message presentation to the profiles. The MP primarily functions to map description of the marketing message specified by a third-party sponsor into the targeting criteria of the ad messages indicating conditions for targeted profiles selection. The MP contains functionality to aid translation of targeted object description into longitudes and latitudes coordinates of the targeted object.

For efficient profiling of user mobility historical data the MP performs profiling off-line responding to a system operator command to identify all profiles in the HPB with matching time/location conditions of the targeting command. For example, for a targeting category defining frequent skiers, the MP initiates scanning of the HPB to select each profile that has been register in the targeting location of a ski resort given number of times.

The MP contains functionality to enable exchange of profile data between communicating profiling servers. The MP of a profiling server can forward a request over a public network to the central profiling server to retrieve a user profile with specified attributes. The MP receives and stores requested profiles in corresponding profile data stores.

The Targeting Processor (TP) responding to a campaign order received from the MP selects targeting profiles by matching targeting criteria with parameters of the profiles. The process of targeting is shown in detail in FIG. 5. Upon receipt of a campaign order the TP retrieves appropriate targeting command from the TPB. Further steps of the profiling process are associated with the activated campaign order. After extracting targeting criteria the TP retrieves each of the PINs from the user habit profile storage with matching habit profile categories. Next, the TP sets up location and event tracking filters for each of the selected PINs . Next, the TP retrieves location data for each selected PIN from the MPS to feed those data in the tracking filters. Finally, the tracking filters of the TP output PINs that according to the composition of the procedure match targeting conditions of the advertising message. The TP associates the list of the selected PINs with the ad message and transmits the message to the mediation server according to specified presentation parameters.

The profiling processor (PP) creates user habit profiles by associating targeting categories with PINs through comparison of targeting criteria for each of the categories with the historical mobility data.

The PP responds on profile orders manually triggered by the system operator via an interactive software environment. The profile order includes a list of profiling parameters and predefined category ID for those parameters. For example, the order may contain name of the category (frequent ski resorts visitors), location coordinates of the ski resort(s), time of visiting ski resort(s), duration of stay in the ski resort(s), number of visits of the resort(s), etc. The order means a request to identify all of the users frequently visiting ski resorts. Upon receipt of the profile order PP scans HDB records for PINs with location parameters matching the targeting criteria specified in the profile order. Upon completion of the search the PP updates PDB adding the new profile category to each of the selected PINs

#### B. The Mediation Server

FIG. 6 illustrates the logical architecture of the Mediation Server including key components and interrelationships according to a preferred embodiment of the invention. As described in detail below, the Mediation Server includes a location data message store (LDMS), a personal identity translation table (PITT), a collection and translation processor (CTP), Privacy Module (EP) and a distribution processor (DP). Each of the component parts shown in FIG. 6 are described below.

The location data message store (LDMS) interfaces with wireless network devices receiving and buffering mobility data that come from the wireless network. The LDMS functions as a primary data storage to allow a collection and translation processor (CTP) to correlate location records asynchronously arriving from the wireless network. The LDMS collects information from various sources of the mobility data including, but not limited to, the billing records (CDR and EDR), user network location information, the positioning data, the global positioning data, and the like. Location records are identified in the LDMS by personal identifiers of a wireless user e.g., mobile identification number (MIN), the international mobile system identity (IMSI), mobile IP, and the like. The LDMS communicates with the CTP forwarding location records queried by the CTP.

The collection and translation processor (CTP) retrieves location data from the LDMS and translates this data into a sequence of user mobility records each including, but not limited to, user identification number (e.g., MIN, IMSI, Mobile IP, etc.), geographical coordinates of the user, time of registration in the geographical locality as shown in FIG. 4B. The operation of the CTP requires several steps as follows. First, the CTP correlates location data retrieved from the LDMS to extract information necessary to generate a user location record. The CTP converts user network location information received from the wireless network into longitudes and latitudes of geographical positioning by associating the network location data with predefined geographical reference plan. Next, the CTP generates a mobility detail record (MDR) including, but not limited to, personal identifiers, longitudes and latitudes and the timestamp. Finally, the CTP forwards the MDR to the encryption module (EM) for subsequent transmission to the connected profiling server.

The encryption module (EM) substitutes personal identifiers of a wireless terminal (e.g. MIN, IMSI, Mobile IP, etc) with a Personal Identification Number (PIN) that does not allow to restore the personal identifiers in the MDRs communicated to/from profiling servers. Conversely, the EM translates PIN into personal identifiers for each of the targeted messages coming from the profiling servers.

The encoding of user personal identities requires several steps, as follows. First, the EM extracts the mobile identification number (MIN) or/and any other user identifier from the mobility data record . Then the EM translates the user's identifier into the PIN according to the encoding procedure described in detail below. Next, the EM stores user's PIN associated with user's personal identifiers in a personal identity translation table (PITT) to ensure a uniquely defined translation of the personal identifiers into PIN for each of the users. Finally, the EM substitutes the personal identifiers with the PIN in the MDRs forwarded to the connected profiling server.

, To restore personal identifiers from PIN selects the PIN in the message coming from a profiling server, retrieves personal identifiers from the PITT and substitutes the PIN with the personal identifiers in the targeting message.

The distribution processor (DP) provides message exchange between communicating entities including devices of wireless network, mediation servers and profiling servers. The DP contains software interfaces which enable (i) transmission of targeting message to the wireless network for subsequent delivery of the messages to wireless users, communication of MDRs between profiling servers and mediation servers, communication of profile data between profiling servers across the advertising network.

The DP maintains a list of profiling servers connected to the mediation server, forwarding MDRs to the assigned profiling server.

#### C. Network Architecture

Illustrated in FIG. 7 is a high-level block diagram of an exemplary advertising network which contains a plurality of profiling, a plurality of mediation servers, a central mediation server and a central profiling server. Each of the mediation servers interconnects with wireless network to provide ability of receiving mobility data from the wireless network and sending advertising message to wireless users. Each of the profiling servers provides interactive environment to target advertising messages.

The mediation server and the central mediation server preferably reside at the network operator premises as adjunct processors to the wireless network equipment. Positioning of mediation servers at the operator premises qualifies mediation servers to handle security matters on behalf of the wireless operator providers. The profiling server is operated by an advertisement provider via a remote link and can be positioned in any geographical location.

The advertising network architecture of the present invention contains multiplicity of profiling servers being connected to a single mediation server, whereas each of the profiling servers being connected only to a single mediation server. The network architecture of the present invention coupled with security procedure outlined below enables unique, secure and interoperable addressing of the wireless users in the advertising network.

The central mediation server enables inter-exchange of profiling information between profiling servers. The central profiling server collects user, mobility and target profiles to enable execution of global marketing campaigns involving multiplicity of geographically separated local advertising sites.

A wide range of untrusted communication mediums can be employed in the present invention to connect profiling and mediation servers including Internet (or other public network), a private network, a private communication channel, or a combination of thereof.

#### IV. Security of User Identities

A method for concealing personal identifiers of wireless user applies to the network architecture illustrated in FIG. 7. The method provides translation of personal identities of wireless users into secure profile identification numbers (PIN) which does not allow profiling servers to recognize true identity of wireless users when using those PINs for unique identification of wireless users. The encryption method is a software program encapsulated in the encryption module of the mediation server. The method advantageously allows profiling servers of the advertising network to gather mobility information on wireless users, carry out profiling of the collected mobility data and target advertising messages using no personal identities of the users. The operation of the encryption method allows profiling servers to exchange user profiles indexed by profiling server-specific PINs without having to share secret decoding keys.

The PIN is generated at the profiling server by combining MIN (here an further MIN is used as an example of the personal identifiers) with the PSI (pseudo-random number assigned by the mediation server to each of connected profiling servers) (e.g., by interleaving bits of MIN with the bits of PSI), and then using a conventional one-way (e.g., non-reversible) algorithm such as MD4(Message-Digest 4) to convert the PIN/PSI combination into a hash code (see MD4 description in [ ]). Because the PIN is generated using a one-way hash algorithm, the Advertisement Provider can not extract the user's MIN (or any other meaningful information about user's identify) from the PIN code. The one-way hash algorithm is used here as an example, therefore it is appropriate to use any other type of cryptographic algorithms to generate the PIN code. The method generates server-specific set of PINs which is unique for each of the profiling server.

In operation the procedure requires several steps. The system maintains a list of identification numbers assigned to each of the connected profiling servers. Also the security procedure allocates the mobile identity translation tables (MITT) for each of the connected profiling servers. In downstream communication, the security procedure reads the MIN in the mobility detail records (MDR) coming from the CTP. Next, the procedure verifies if the PIN corresponding to the MIN already exists in the table identified by the profiling server identity (PSI) number. If the PIN is found in the table then the procedure substitutes the MIN with the PIN in the outgoing MDR. If the PIN is not found in the table then the security procedure executes an encoding routine for translating MIN into the PIN. The generated PIN is stored in the MITT identified by the corresponding PSI.

In upstream operation, the procedure reads the PIN in the advertising message coming from the profiling server. Then, the procedure retrieves corresponding MIN from the look-up table MITT identified by the PSI number. Finally, the procedure substitutes the PIN with the MIN in the message.

The procedure enables secure exchange of user profile data between profiling servers. As result of the substitution of user identities, each of the profiling servers holds a unique array of PINs such that same wireless user appears in different profiling servers identified by different PINs. The system exchanges user profile data via successive substitution of user identities of user identities in the series of mediation servers connecting those profiling servers that exchange profiling data. For the exemplary network illustrated in FIG. 7, the exchange between profiling servers 1 and 2 requires three encoding steps. First, the profiling data is encoded in the mediation server 1 translating PIN1 (PIN of the profiling server 1) into the MIN. Next, the profile is forwarded from the mediation server 1 to the mediation server 2 via central mediation server. Next, the mediation server 2 translates the MIN into PIN specific for the profiling server 2. Finally, the profiling server 3 receives the user profile originally stored in the profiling server 1.

Important business consequence of the encoding scheme is that no privacy agreement is to be made between the owner of the mediation server and/or the users and/or wireless operator since the owner of the profiling server does not hold at any time any personal information of wireless users.

#### V. Method For Profile Exchange

Global deployment of the network shown in FIG. 7 requires rules to enable exchange of user profile information between profiling servers operating in different geographical localities. The profile exchange rules are required in several circumstances. First, profiling servers may want to inquire information about users serviced by other profiling servers. Also the central server may want to make inquiries about profile of targeting users to perform global advertising campaign.

In order to facilitate exchange of user profiles, the system of the present invention requires each of the profiling servers of the advertising network to operate with generic format of target profiles, user profiles and mobility profiles as defined in FIG 4.

Mediation Servers of the advertising network exchange requests for user and/or mobility and/or target profiles communicating with each other via Central Management Server to ensure a unique set of profile data across the entire advertising network. The exchange of requests is controlled by Management Servers communicating with the CMS via public network (e.g., Internet).

Upon receiving of the request for a user profile and/or mobility profile from one of Profiling Servers, the Management Processor of the CMS retrieves the requested profile from corresponding data base and forwards the profile to the Profiling Server via the chain of Mediation Servers connecting the CMS and targeting Profiling Server. Mediation Servers provide translation of PIN code of the CMS into PIN codes of the targeting Profiling Server without danger to expose identify of wireless users to the advertising network.

Profiling Servers exchange target profiles directly without having Mediation Servers involved in the communication process since the target profiles do not contain any encoded user related information.

## VI. System Operation

The operation of the system of present invention is now described in connection with the flow diagrams shown in FIGS. 8 and 9. FIG. 8 illustrates a flow diagram of a system for delivering and targeting of advertising messages in accordance with one embodiment of the invention.

### Targeting Process

Referring to block 1 of FIG. 8, the targeting process starts with reception of marketing campaign including a content message and a description of the marketing campaign, including advertising message, description of the targeting group of wireless users, criteria of reaching targeting users (by location and/or time and/or event and/or historical behaviour) and presentation parameters of the advertising messages (frequency, time, maximum number, etc.).

Referring to block 2, the system operator with aid of the MP, creates a customized campaign order by setting targeting parameters associated with the ad message. The MP identifies positioning of the targeting objects in terms of geographical zones defined in unified coordinates. The MP stores the targeting command in the TPS.

Referring to block 3, in response to profiling order, the PP scans the HDB to identify each of the PINs with mobility patterns matching targeting conditions. The PP updates the each of the records in the TPS that matched the targeting conditions.

With reference to block 4, after receiving the campaign order the TP creates a search process associated with the order ID and based on the targeting parameters specified in the order. The TP communicates with the TPB and MPB comparing targeting criteria of the advertising message with real-time and behavioural profiles to identify each of the matching PINs. The TP discontinues to search targeting PINs as soon as the termination condition set in the campaign order is detected.

With reference to block 5, upon completion of the PIN selection process, the TP forwards advertising message coupled with a list of selected PINs to the connected mediation server. The TP controls transmission of the targeting messages according to the presentation parameters specified.

With reference to block 6, upon reception of the advertisement coupled with a list of PINs in the mediation server, the encryption module translates each of the PINs into personal identifiers of wireless users.

With reference to block 7, after decoding of personal identifiers, the DP sends advertising messages to the wireless network for presentation to wireless users.

#### **Collection Process**

As shown in FIG. 9, the collection process includes collection of primary mobility data from the wireless network, generating of call details records, masking user identities and storing data in the profiling server.

Referring to block 1, upon reception of mobility data from wireless network the CTP stores the mobility data in the LDMS.

Referring to block 2, the CTP retrieves mobility data from the LDMS to produce LDR indexed by personal identifiers of a wireless user.

Referring to block 3, the EM substitutes personal identifiers of wireless users in the LDRs with profile identification numbers. Next the DP transmits encoded LDRs to connected profiling servers.

Referring to block 4, upon reception of LDRs in the mobility data storage, LDRs are forwarded to the HDB for long term storage.

CLAIMS

1. A method for targeting and delivering advertising and/or content messages to wireless users comprising the steps of:
  - receiving information from wireless terminals that indicate geographic positioning and habits of wireless users in wireless networks;
  - creating detailed profiles of wireless users containing no user-specific information like MINs, IMSIs, mobile identifiers, phone number, or the like;
  - searching and selecting of targeted profiles of wireless users for advertising and/or content messages; and
  - delivering of advertising and/or content messages to targeted profiles of wireless users in wireless network.
2. A method according to claim 1 whereby said user profile contains:

instant positioning profile data containing most recent user positioning data including, but not limited to, a profile identification number, positioning of the wireless terminal and a time stamp;

user habit profile data containing a list of the profile identification numbers each of which is associated with a list of user habit categories ; and

mobility history profile data comprising numerous instant mobility profile data collected in a cumulative fashion with continuous live updating.

3. A method according to claim 2 wherein said user category profile is obtained through comparing said target profile data and said mobility history profile data;

4. A method according to claim 1 wherein said targeting command associated with said advertising message comprises:

a targeting criteria for selecting desired group of wireless users, the targeting criteria defined by proximity to a given location and/or time interval and/or a category of wireless users stored in said user category profile data base; and

a presentation criteria for delivering said advertising message to wireless terminals selected in accordance with said search criteria, the presentation criteria defined by triggering events, scheduled time of calls, maximum number of times of presentation to a single wireless user, maximum number of users and the like;

5. A method according to claim 1 wherein said encrypting process substitutes personal identifiers of said wireless user with a profile identification number for concealing true identity of said wireless user in operations of said targeting and profiling;
6. A method according to claim 5 wherein said encrypting process is a reversible process capable to restore personal identities of said wireless user from said profile identification number associated with said wireless user;
7. A method according to claim 1 wherein said selecting process identifies targeting group of wireless users for a given advertising message via comparing preset targeting criteria of said targeting command with said user profile data for each of the wireless users identified by their profile identification numbers;
8. A method according to claim 2 wherein profile identification numbers is used as the only means to identify wireless users in user profile data and in said process of selecting targeting group of users;
9. A method according to claim 1 wherein a given advertising message is presented for delivering to selected wireless terminals according to said presentation criteria associated with the advertising message;
10. A method according to claim 1 wherein said advertising message is stored in association with said presentation command;
11. A method according to claim 1 wherein said wireless terminal is a wireless terminal carried by wireless users and having SMS and/or WAP capabilities enabled;
12. A method according to claim 1 wherein said presentation message is SMS compliant text message and/or image or graphical object and/or digitized voice data and/or any other form of an advertising message suited for presentation at SMS and/or WAP terminals;
13. A method according to claim 1 wherein positioning of wireless users is estimated by geographical positioning of the cell id in case other information from MPS or GPS devices is not available;

14. A system for delivering advertising messages to wireless users, comprising:

a mediation server for interfacing with wireless network devices which transmit advertising messages to the targeted user terminals; a mediation server for ensuring security of wireless user identities by using an encryption method as described below; a mediation device to communicate wireless user positioning data from the wireless network to a profiling server; a mediation server to estimate geographical positioning of users from collected mobility data.

a profiling server for interfacing with sponsoring companies providing a text of the advertising message coupled with descriptive parameters of the targeted subscriber group and said targeting command; a profiling server for selecting non-personally identifiable group of users through tracking and profiling of user mobility data

15. A system as claimed in claim 14, wherein each mediation server communicates (receives/transmits) information from/to at least one said profiling server and/or another mediation server, wherein each profiling server communicates (receives/transmits) information from/to only one respective mediation server

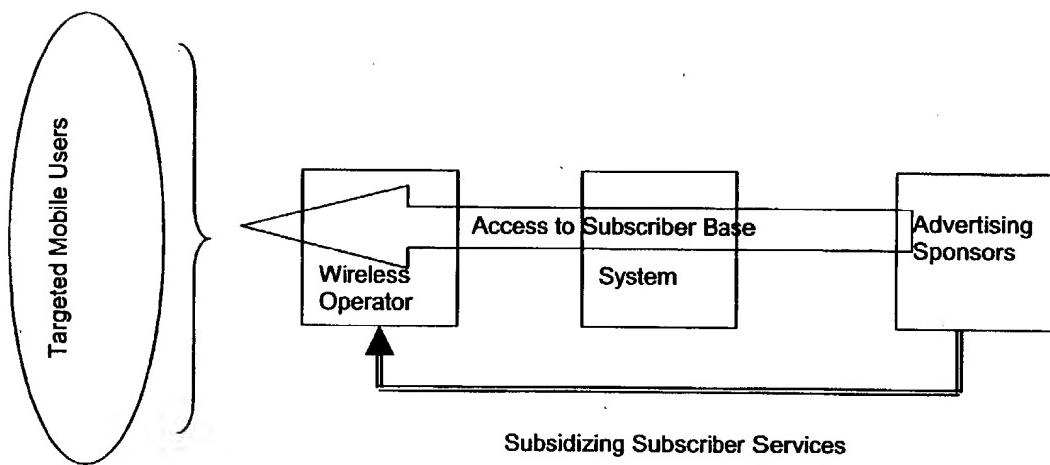
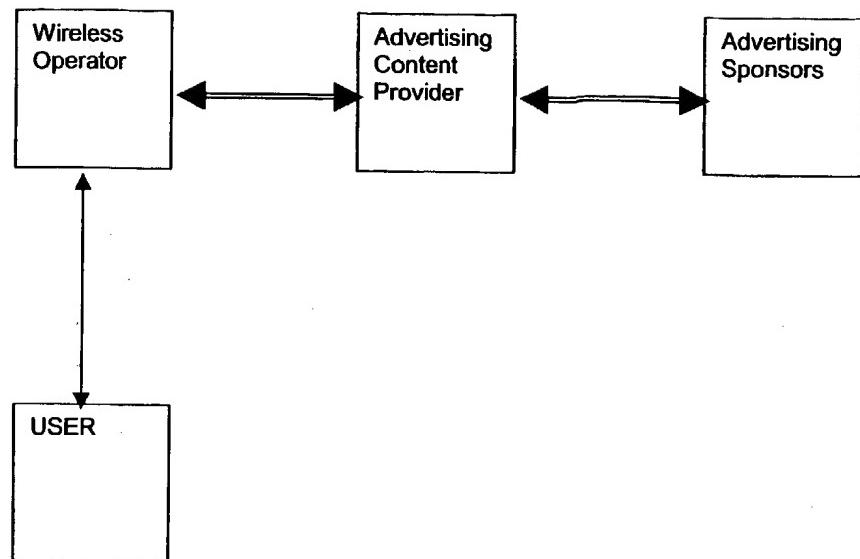
16. A system as claimed in claim 14, wherein said profiling server includes

a collection of data bases comprising a history profile data base for storing said mobility history profile data, a user profile data base for storing user category profile data, an instant mobility data base for storing instant mobility profile data and a advertising data base for storing ad messages coupled with corresponding targeting commands;

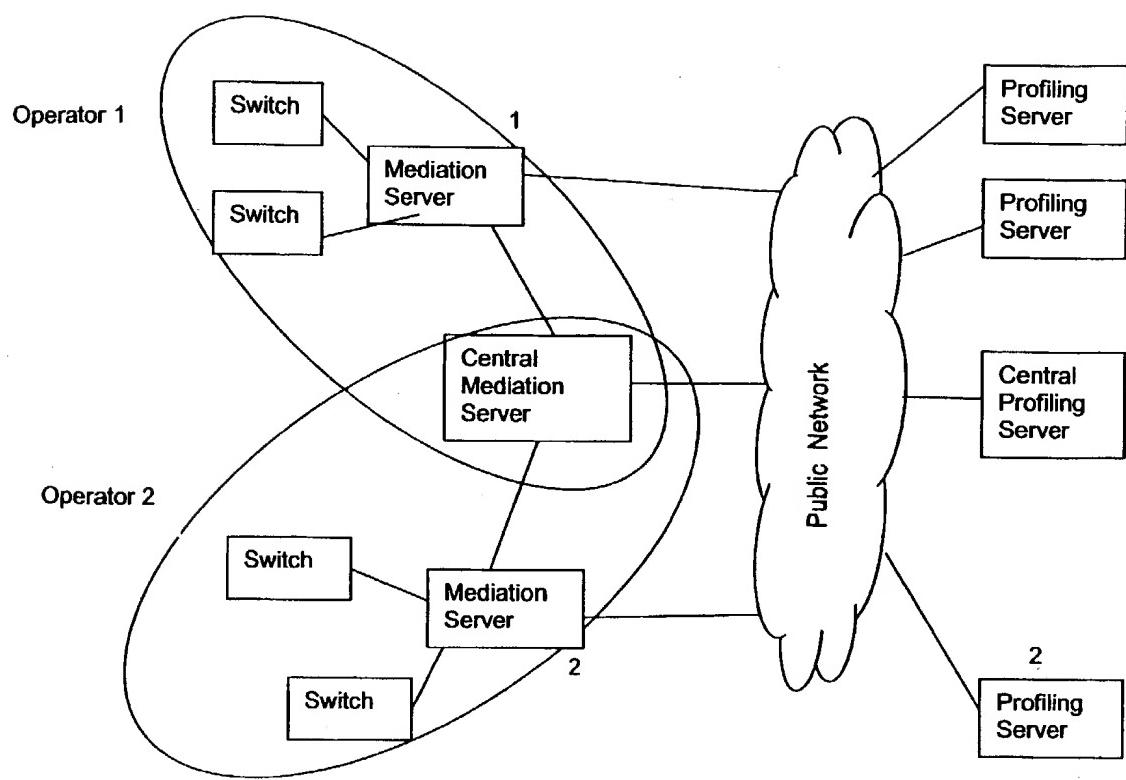
a targeting processor for selecting an array of profile identification numbers for each of advertising messages through comparing preset targeting criteria of each advertising message with user profile data of each of the users; the targeting processor for delivering of said message to said mediation server in accordance with the presentation criteria associated with the given message;

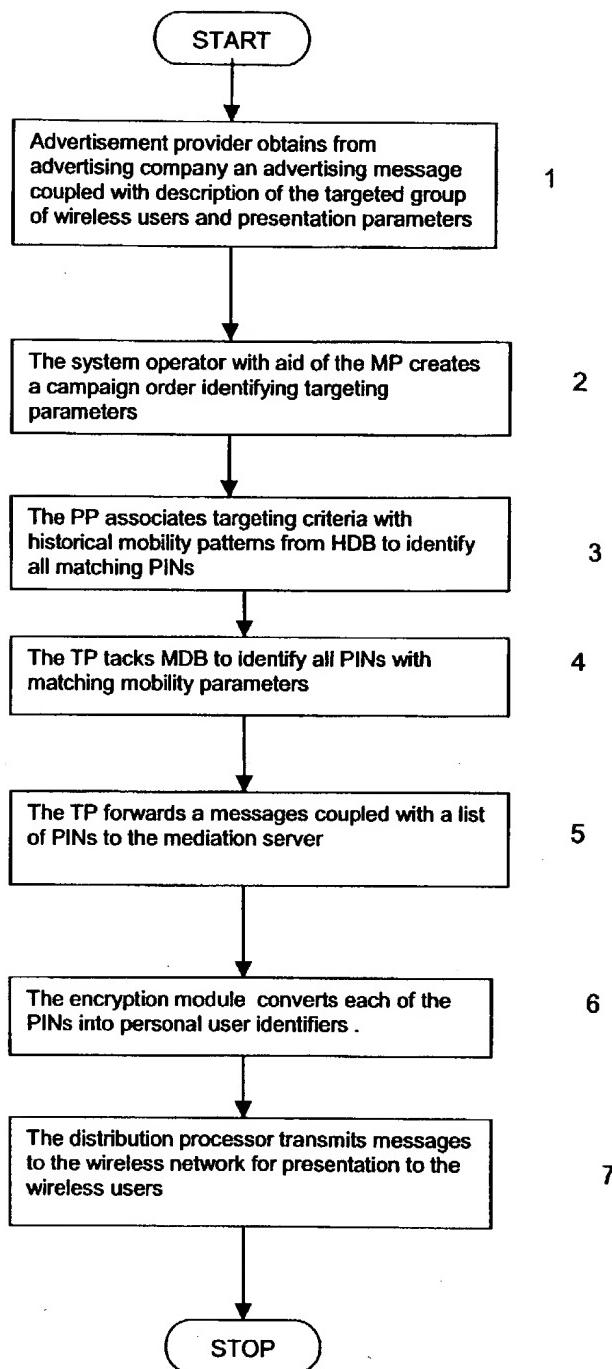
- a profiling processor for creating user category profile data by comparing a each of the targeting criteria with said mobility history profile data for each of the users; the profiling processor responding to a manually triggered command to obtain user category profile data; the profiling processor allowing to accumulate over time said user category profile associating each of profile identification numbers with a list of categories characterizing wireless users;
- a management processor for providing an interactive environment for operators of the system to create said advertising message in association with said targeting command; the management processor for triggering execution of said targeting command; the management processor for controlling exchange of user profiles between profiling servers of said advertising network;
17. A system as claimed in claim 14, wherein said mediation server includes  
a collection of data bases comprising a data base of primary data for storing mobility data continually arriving from devices of the wireless network and a personal identify translation table for storing associations between personal identifiers of wireless users and corresponding profile identification numbers  
a distribution processor for transmitting ad messages stored in said data base of distribution messages to devices of the wireless network for subsequent presentation of ad messages at appropriate wireless terminals; the distribution processor for providing communication with connected profiling servers;  
a collection and translation processor for receiving primary data from wireless in the form of packets comprising information about locality of wireless terminal; the collection and translation processor for generating a location detail record for each of the incoming packets; the collection and formatting processor for providing estimates of a wireless station positioning;  
an encryption module for providing two-way translation between wireless terminal identification numbers (e.g. MIN, IMSI, Mobile IP, etc.) and profile identification numbers according the method described below;

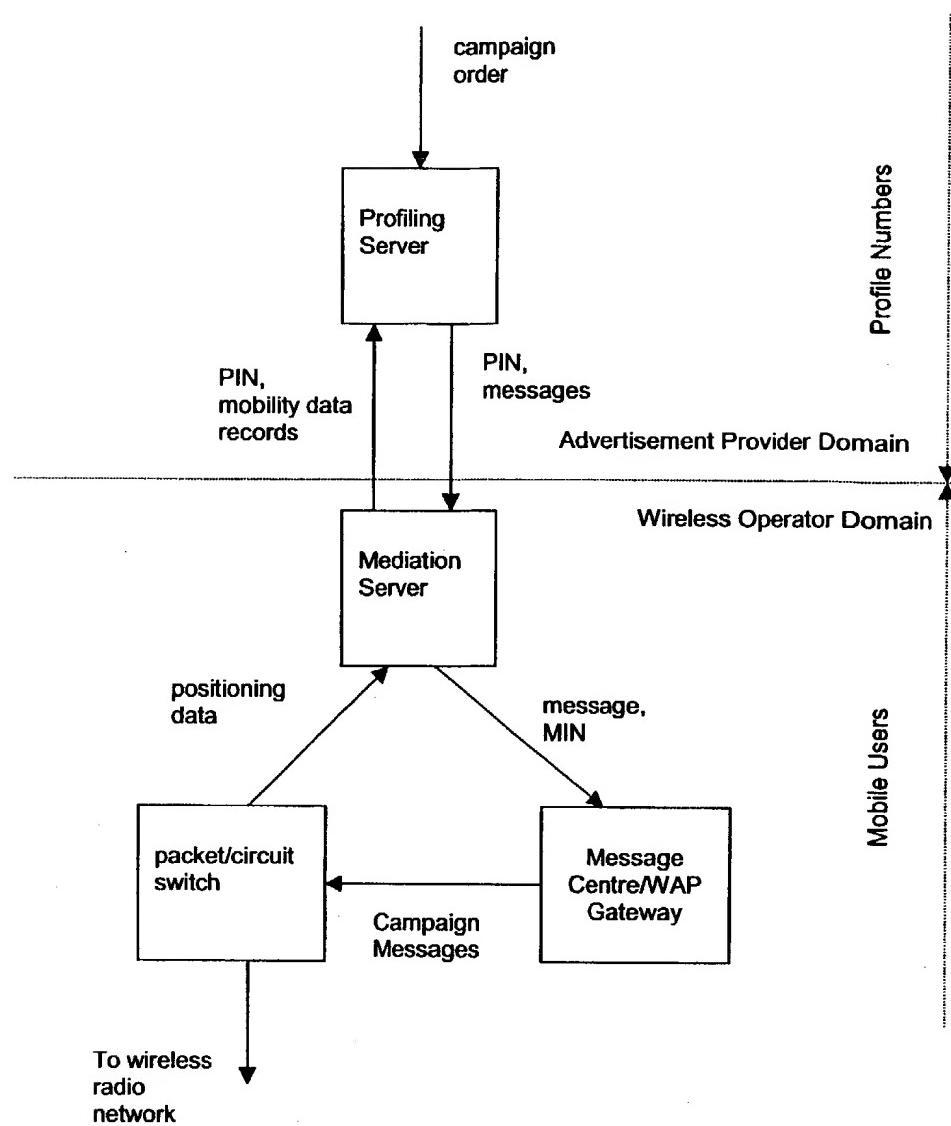
18. A system as claimed in claim 1, wherein one mediation server and one profiling server, named respectively central mediation server and central profiling server, are used to coordinate exchange of user profiles between separate profiling servers.
19. A system as claimed in claim 15 and claim 18, wherein said profiling, mediation, central profiling and central mediation servers communicate with each other via a public network (e.g. Internet, etc.)



**FIG. 1**

**FIG. 7**

**FIG. 8**

**FIG. 2**

**FIG. 4A**

MSG_ID	Category Id	Descript	Search Criteria	Init/Terminate Criteria
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Search Criteria      Location 1 AND/OR Time Frame 1 AND/OR Event 1 AND/OR Profile  
                      try 1 ...

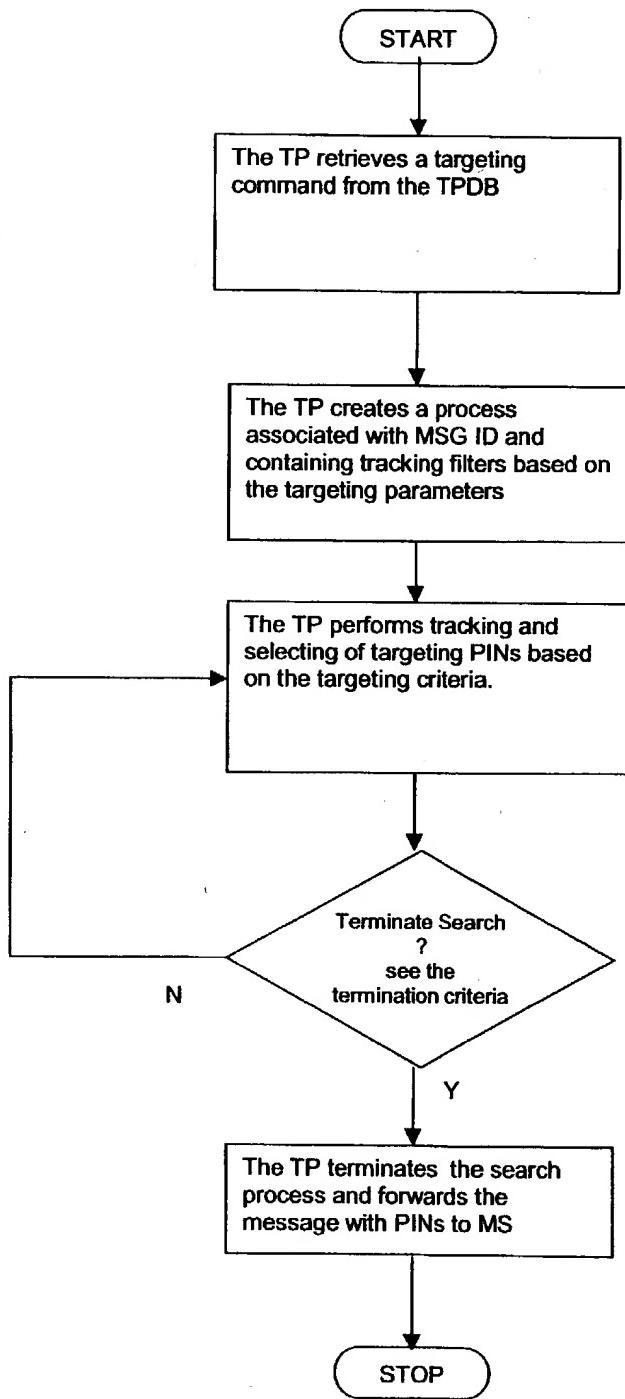
Init/Termination Criteria      Time AND/OR MAX\_PIN AND/OR NB\_Event

**FIG. 4B**

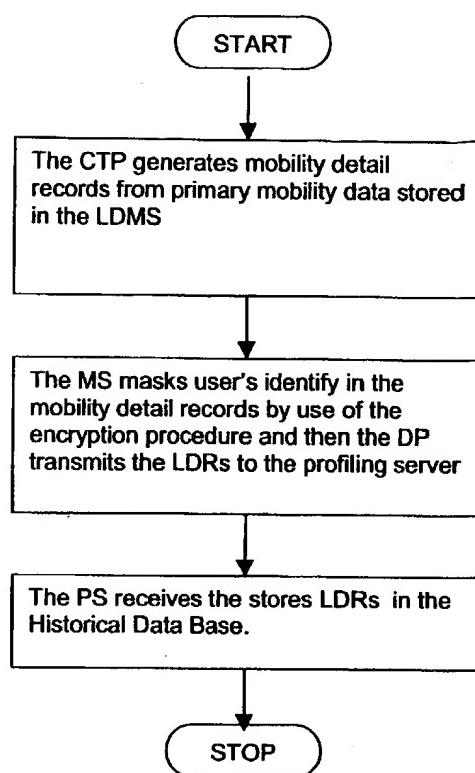
PIN	Locality	Time Stamp	Duration
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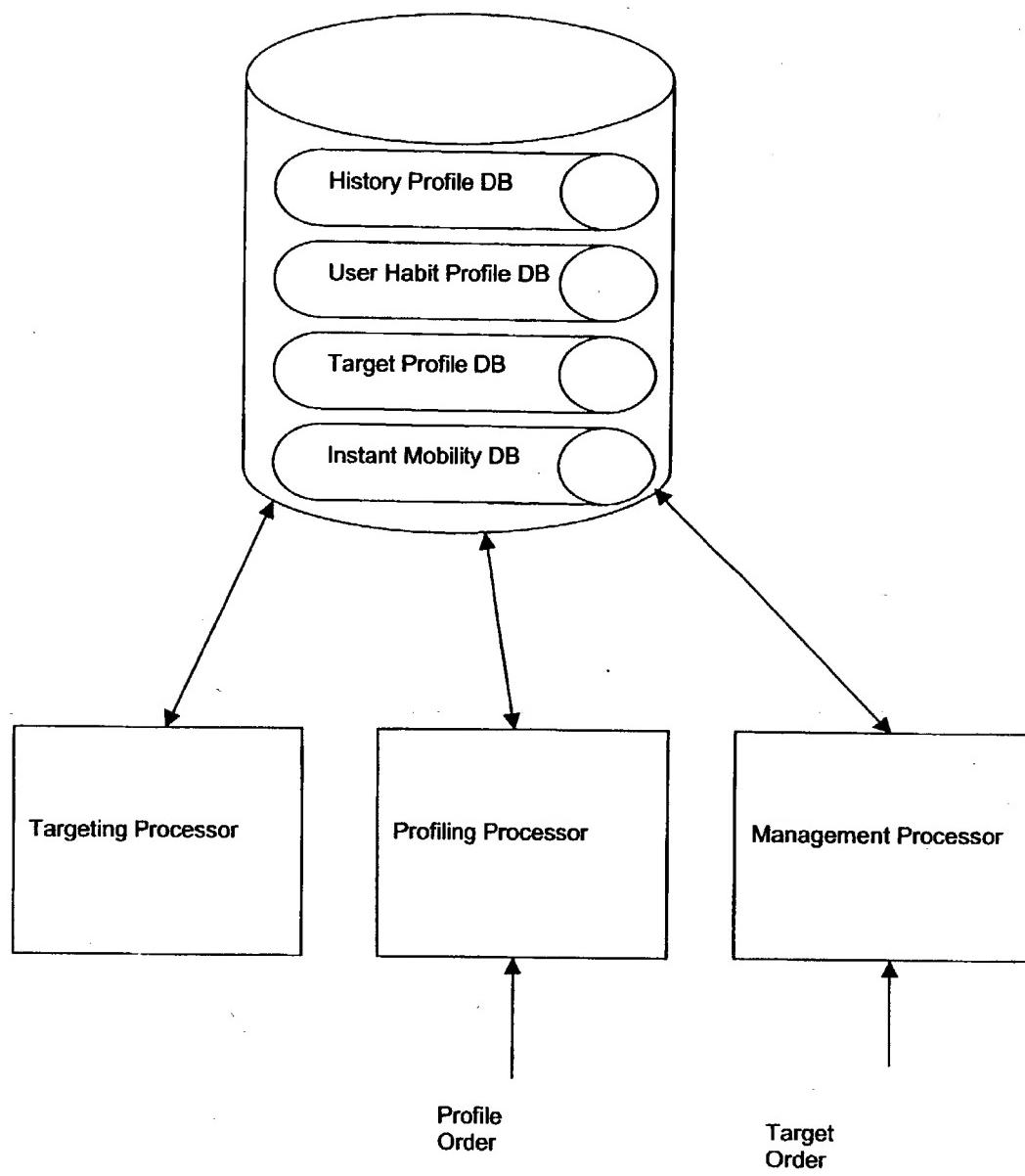
**FIG. 4C**

PIN	Category Id	Category Id	Category Id	...
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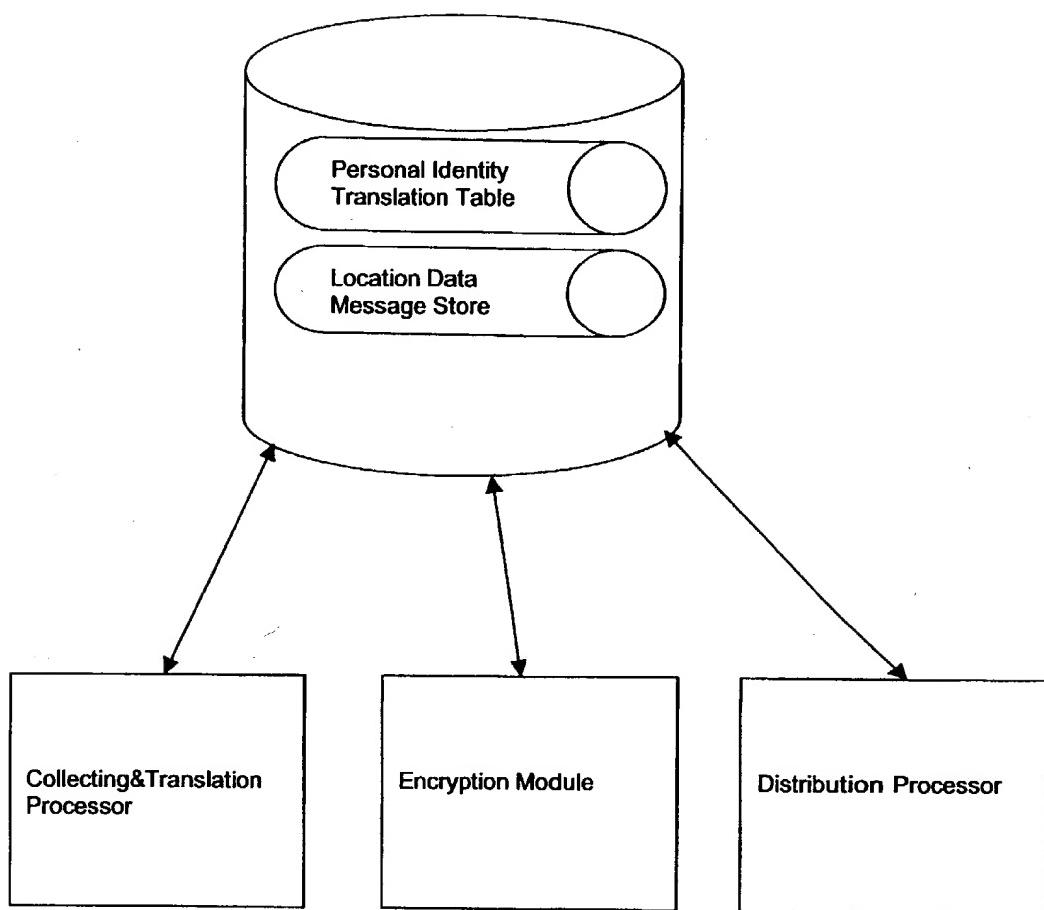


**FIG. 5**

**FIG. 9**



**FIG. 3**



**FIG. 6**

